



## State of Vermont

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Department of Environmental Conservation  
State Geologist  
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Department of Environmental Conservation  
Waste Management Division  
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October 15, 1997

ATTN CYNTHIA WALKER  
TDS TELECOM  
111 MAIN ST  
LUDLOW VT 05149-1025

RE: Initial Site Investigation of Diesel UST Release - Ludlow Telephone (#95-1827) - Ludlow, Vermont

Dear Ms. Walker:

The Waste Management Division, Sites Management Section (SMS) has received the initial site investigation report for the above referenced site submitted by Marin Environmental dated September 5, 1997.

Based on the information provided in this report, the SMS has determined the following:

- Levels of benzene, toluene, ethyl benzene, and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) in the monitoring wells (MWs) are below groundwater enforcement standards. Of those results, benzene was found in MW-3 and MW-4, ethyl benzene in all four MWs, xylenes in MW-2 and MW-4, and MTBE in MW-1, MW-3, and MW-4. Some of the low level contamination detected (most likely benzene and MTBE) is likely from a release of gasoline from a former UST that was removed from the site in June of 1995 or from the up gradient Ludlow Mobil site (1,000 ft), the migration of which could have been aided by preferential pathways (utilities).
- Groundwater appears to flow north toward the Black River.
- Residual contamination appears to be limited to the vicinity of the former tank pit.
- The only potentially sensitive receptor appears to be the Black River. Water samples collected at the shoreline closest to the former tank pit and both up and down stream of that location found no detectable levels of volatile organic compounds (VOCs). Drinking water in the area is supplied by the town's spring fed water system which is 4.5 miles up gradient and no VOCs were detected in any nearby buildings.

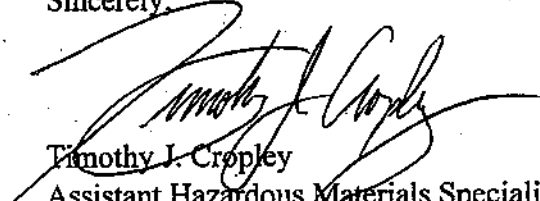
Based on the above and the recommendations of Marin Environmental, the SMS requests that Ludlow Telephone have its consultant do the following:

- 1) Collect another round of samples from the MWs and analyze by EPA Method 8020 and modified EPA Method 8100.

- 2) Submit a summary report which includes all relevant site information, conclusions, and recommendations.

If you have any questions or comments, please feel free to contact me by phone at (802) 241-3896, by email at [timc@dec.anr.state.vt.us](mailto:timc@dec.anr.state.vt.us), or in writing at the above address.

Sincerely,



Timothy J. Cropley  
Assistant Hazardous Materials Specialist

cc: Bruce Hamilton, Marin Environmental

TC/tc/sms/951827



# Marin Environmental, Inc.

Environmental Consultants and Engineers

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5 September 1997

Ms. Cynthia Walker  
TDS Telecom  
111 Main Street  
Ludlow, VT 05149-1025

RE: Initial Site Investigation Report,  
Ludlow Telephone

Dear Ms. Walker,

Enclosed is one bound copy of the Initial Site Investigation Report for Ludlow Telephone, located in Ludlow, Vermont. This report outlines the findings of the expressway investigation completed in June 1997.

Please contact me or Ron Miller, Regional Manager, if you have any questions or comments regarding this report.

Sincerely,

*Bruce W. Hamilton for*

Bruce Hamilton  
Environmental Engineer

enclosure

cc. Chuck Schwer

Ref: 97039C01.DOC

1827

SEP 8 10 27 AM '97



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## INITIAL SITE INVESTIGATION REPORT

### LUDLOW TELEPHONE

111 Main Street  
Ludlow, VT 05149

3 September, 1997

Prepared for:

**TDS Telecom**  
111 Main Street  
Ludlow, VT 05149-1025

Contact: Ms. Cynthia Walker  
Phone: 802-228-9911

Prepared by:

**Marin Environmental, Inc.**  
*Ground Water of Vermont*  
1700 Hegeman Avenue  
Colchester, VT 05446

Contact: Bruce Hamilton  
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MARIN Project #: V97-039  
MARIN Document #: 97039R02.DOC

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## EXECUTIVE SUMMARY

The Ground Water of Vermont division of Marin Environmental, Inc. (MARIN) has conducted an initial site investigation at Ludlow Telephone located on Main Street, Ludlow, VT and has concluded the following:

- Petroleum released from a former underground storage tank (UST) system at the site appears to have resulted in a minor impact to ground water in the vicinity of the former UST system. Analytical results of ground-water samples collected from four on-site monitoring wells did not detect the presence of petroleum compounds above the Vermont Groundwater Enforcement Standards (VGESs). Methyl-tertiary-butyl ether (MTBE) was detected in ground-water samples at levels below the Vermont Health Advisory Guideline and may have resulted from migration along preferential utility pathways or an upgradient release.
- Observations made during the UST closure and ground-water sample results from monitoring wells completed in and downgradient of the former UST locations suggest that residual contamination is limited to the immediate vicinity of the former UST.
- The residual subsurface contamination at the site does not appear to pose a threat to any nearby sensitive receptors.
- No drinking-water supplies appear to be at risk from the residual contamination at the site. No petroleum compounds were detected in any of the three surface water samples collected from the nearby Black River.
- Surficial materials at the site consist mainly of medium to fine sand and gravel, with occasional cobbles. On 19 June 1997, the water table was found to range from about 7 to 11 feet below ground surface, and exhibited a northerly trending gradient of about 6 percent.

On the basis of the results of this investigation, MARIN makes the following recommendations:

1. The four on-site monitoring wells should be resampled to confirm the June 1997 analytical results. The samples should be analyzed for petroleum-related compounds by EPA Method 8020 and modified EPA Method 8100.
2. If the subsequent ground-water analytical results confirm the findings of the June 1997 analytical data (no exceedance of VGESs), MARIN recommends that the site be considered for "Site Management Activities Completed" (SMAC) status by the Vermont Department of Environmental Conservation (VT DEC) .

## **1.0 INTRODUCTION**

This report details the results of an initial site investigation conducted at Ludlow Telephone located on Main Street in the town of Ludlow, Vermont (Figure 1). This report has been prepared by the Ground Water of Vermont division of Marin Environmental, Inc. (MARIN) under the direction of Ms. Cynthia Walker of TDS Telecom, the current owner of the facility. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval following the discovery of subsurface petroleum contamination during the removal of one underground storage tank (UST) on 30 April 1997.

### **1.1 Site Location and Physical Setting**

The site is located at 111 Main Street (Vermont Route 103) in the town of Ludlow, Vermont. The facility consists of administrative offices, an attached generator room and associated parking. A smaller maintenance/storage garage is located immediately to the east of the office complex. The on-site building is located approximately 25 feet from the northern edge of Main Street in a combined residential/commercial section of the town. Approximately 30 feet north of the on-site building, the land surface drops sharply approximately eight feet to the Black River. The ground surface around the on-site structures has an average elevation of about 1,000 feet above mean sea level and is generally flat. The presumed direction of ground-water flow in the area is toward the north-northeast in the direction of the Black River, which borders the property (USGS, 1971).

The site and all nearby residences (the closest being a multi-family apartment complex approximately 40 feet to the west of the property) are served by the Ludlow municipal drinking-water supply system.

### **1.2 Site History**

On 30 April 1997, MARIN supervised the removal of one underground storage tank (UST) located at the Ludlow Telephone Company facility. The removed UST was a 300-gallon in-service, single-walled-steel diesel UST, reportedly installed in 1983, located adjacent to the northwest corner of the building, beneath a paved walkway. The diesel tank had been constructed on a concrete pad with anchor/tiedown attachments. The UST was found to be in fair condition upon removal with some surface rust and slight pitting noted. No holes were observed along the tank surface. Associated fill and vent-line piping for the UST was in fair condition, with some surface rust but no apparent holes. The unions for both the copper suction and return lines were loose (could be manually rotated), however, with evidence of petroleum staining in surrounding soils.

Soils in the UST excavation consisted of loamy medium-to-fine sand to a depth of 7 feet below ground surface (bgs). Soils in the area surrounding the suction and return lines exhibited dark black staining and a strong petroleum odor. Deeper soils (depths of 6-7 feet bgs) exhibited a slight petroleum odor but no staining.

Ground water was not observed in the UST excavation at a depth of about seven feet bgs. No free product was observed.

Soils in the vicinity of the UST were screened for the possible presence of volatile organic compounds (VOCs) with a Photovac Tip II portable photoionization detector (PID). The PID was calibrated with isobutylene gas to a benzene reference. Soil samples were placed in Ziploc bags, which were then sealed and agitated. Bag headspace was then screened for the presence of VOCs with the PID.

PID readings on soil samples collected from the UST excavation ranged from 0.2 to 445 parts per million (ppm), with the highest concentrations noted at the top of the tank in the vicinity of the suction/return lines at a depth of 3-4 feet bgs. PID readings in the UST excavation averaged 108.3 ppm.

Due to site and equipment limitations, it was not possible to completely remove all contaminated soils from the UST excavation. Impeding guy wires, overhead electrical surface and subsurface utilities limited the capacity for lateral movement at the site. In addition, the vertical extent of the contamination could not be defined due to the inability of the excavating equipment to penetrate beneath the level of the concrete support pad. As a result, all excavated soils were backfilled.

MARIN initiated an initial site investigation under the VT DEC "Expressway" process after receiving approval on 2 June 1997 from Ms. Cynthia Walker of TDS Telecom, and the VT DEC.

A previous UST removal was conducted at the site in June 1995, at which time Marin Environmental (then Ground Water of Vermont) supervised the removal of one single-walled, 1,000-gallon gasoline UST and piping at the on-site maintenance garage (located east of the administrative office complex). Although contaminated soils were observed in the vicinity of the tank piping, the soil contamination appeared to be limited in extent. Approximately 0.5 cubic yards of soils with PID readings of up to 898 ppm were excavated and eventually disposed of by incineration.

### **1.3 Objectives and Scope of Work**

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground-water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these purposes, MARIN has:

- Supervised the installation of four soil borings/monitoring wells, and determined the extent of petroleum contamination, and the local ground-water flow direction.

- Screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a photoionization detector (PID).
- Collected and submitted ground-water samples from the on-site monitoring wells and surface-water samples from the nearby Black River for laboratory analysis of volatile petroleum compounds and total petroleum hydrocarbons.
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors.
- Evaluated the need for treatment and/or a long-term monitoring plan for the site.
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

## **2.0 INVESTIGATIVE PROCEDURES AND RESULTS**

### **2.1 Soil Boring / Monitoring Well Installation**

On 10 June 1997, a MARIN engineer supervised the completion of four soil borings/monitoring wells (MW-1, MW-2, MW-3 and MW-4). Approximate monitoring well locations are shown on Figure 2. The soil borings were installed using vibratory drilling technique by Adams Engineering of Underhill, Vermont.

The soils encountered in each boring generally consisted of medium to fine sand and gravel, with occasional cobbles and organic debris. Borings were completed to depths ranging from 15-20 feet below ground surface (bgs). Ground water was encountered between 7.5 and 12 feet bgs at the time of drilling. Soil samples were collected continuously from each boring using a five-foot long core tube lined with polyethylene. Soil recovery was generally poor, ranging between zero and 60 percent. The soil samples were screened for the possible presence of VOCs with a photoionization detector (PID) and logged for lithology by the MARIN engineer. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

1.5-inch-diameter PVC monitoring wells with 10 feet of 0.010-inch slots were installed to 15 feet bgs at MW-1, 14 feet bgs at MW-2, 17.5 feet bgs at MW-3 and to 18 feet bgs at MW-4. The tops of the screen sections were set about four to five feet above the ground-water level. Sections of solid PVC were added to bring the tops of the well casings to approximately 0.5 feet bgs. Clean silica #1 filter sand was placed in the borehole annulus around each well to nominally three to four feet above the slotted interval. A bentonite pellet seal, approximately one foot thick, was set above the sand pack and the remainder of the annular space was backfilled with native material. Each completed monitoring well was protected by a flush-mounted steel roadbox cemented into place (with the exception of MW-1, which was not cemented). Each well casing was topped with a water-tight compression cap. With the exception of MW-4, all of the monitoring wells were developed after installation using a peristaltic pump. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix A.

## 2.2 Soil-Screening Results

Soil samples collected from each boring were screened with a photoionization detector (PID) for volatile organic compounds (VOCs). The Photovac TIP II PID was calibrated with isobutylene gas to a benzene reference. Readings ranged from 0.0 ppm in samples collected from MW-4 to 153 ppm in a sample taken from the same well near the water-table surface at a depth of 14-15 feet bgs. PID screening results are included on the boring logs in Appendix A.

## 2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a northerly direction, toward the Black River. The average gradient of the local ground-water table on 19 June 1997 was about 6 percent. Water-level measurements and elevation calculations for 19 June 1997 are presented in Table 1. The ground-water contour map in Figure 3 was prepared using this data.

**TABLE 1. Ground-Water Elevation Data**

Well I. D.	Top of Casing Elevation *	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	99.1	9.86	89.24
MW-2	97.69	7.24	90.45
MW-3	99.87	10.68	89.19
MW-4	100.00	10.62	89.38

\*Top of casing (TOC) and ground water elevations are relative to an arbitrary site datum of 100.00 feet

Fluid levels were measured in the four monitoring wells on 19 June 1997. The depth to water varied from 7.24 feet (MW-2) to 10.68 feet (MW-3) below top-of-casing. No free-phase petroleum was observed in any of the on-site monitoring wells. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

The shallow aquifer at the site consists mainly of medium to coarse sand and gravel, with occasional medium-to-fine silty sands. These soils typically exhibit effective porosities of about 0.2 to 0.35 and hydraulic conductivities of about 3 to 300 ft/day (Fetter, 1994). Assuming Darcian flow, these estimated ranges of porosity and conductivity combine with the calculated ground-water gradient of 6 percent to yield an estimated range of ground-water flow velocities in the surficial aquifer of between 0.9 and 51.4 ft/day.

## 2.4 Ground-Water Sampling and Analysis

The Vermont Groundwater Enforcement Standards (VGESs) for benzene, toluene, ethylbenzene, xylenes (collectively referred to as BTEX) were not exceeded in any of the ground-water samples collected on-site. The samples collected from MW-3 and MW-4 contained very small quantities of benzene, 2.6 ppb (parts per billion) and trace levels respectively. All ground-water samples contained low (1.1 to 8.6 ppb) or trace levels of ethylbenzene. Methyl-tertiary-butyl ether (MTBE), an octane-boosting gasoline additive used after 1980, was detected in all monitoring wells, at levels below the Vermont Health Advisory guideline of 40 ppm. MTBE may have migrated along preferential drainage pathways (footing drain) from the area of the UST removed in 1995. A petroleum release also occurred in 1993 at the Ludlow Mobil gasoline station, located on Main Street approximately 1,000 feet west and upgradient of the site. Trace levels (less than 1 part per million - ppm) of total petroleum hydrocarbons (TPH) were detected in all monitoring wells and duplicate with the exception of MW-1. Ground-water analytical results are summarized below in Table 2; the contaminant distribution is shown on Figure 4. Laboratory report forms are included in Appendix B.

**TABLE 2. Ground-Water and Stream Analytical Results  
June 1997**

Well I.D.	Benzene	Ethyl benzene	Toluene	Xylenes	MTBE	TPH
MW-1	ND <1	TBQ <1	ND <1	ND <1	5.5	ND <0.8 ppm
MW-2	ND <1	8.6	ND <1	6.4	ND <1	TBQ <0.8 ppm
MW-3	TBQ <1	1.1	ND <1	ND <1	11.2	TBQ <0.8 ppm
MW-4	2.6	8.3	ND <1	4.5	26.0	TBQ <0.8 ppm
Duplicate (MW-1)	ND <1	ND <1	ND <1	ND <1	6.3	TBQ <0.8 ppm (Dup. MW-2)
Trip Blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm
VGES*	5	680	2,240	400	40	--
Black River Up-stream	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm
Black River Mid-stream	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm
Black River Down-stream	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm

Results reported as parts per billion (ppb), unless noted otherwise.

ND = Compound not detected above indicated detection limit.

TBQ = Compound detected at trace levels below quantitation limit indicated.

VGES = Vermont Groundwater Enforcement Standard, \* Vermont Health Advisory for MTBE.

Ground-water samples were collected from four monitoring wells on 19 June and 11 July 1997. Each monitoring well was purged and then sampled using the dedicated bailer and dropline. Purge water was discharged directly to the ground in the vicinity of each well. A

trip blank and a duplicate sample were collected during the June/July sampling events for quality assurance/quality control (QA/QC) purposes. All field procedures were conducted in accordance with MARIN standard protocols.

The ground-water samples were submitted to Endyne, Inc. of Williston, Vermont, where they were analyzed for the possible presence of benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tertiary butyl ether (MTBE) by EPA Method 8020 and total petroleum hydrocarbons (TPH) by modified EPA Method 8100. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. No petroleum compounds were detected in the trip blank, and analytical results for the duplicate samples were identical for TPH (trace below quantitation) and within 15 percent for BTEX and MTBE.

### **3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT**

#### **3.1 Sensitive Receptor Survey**

MARIN conducted a survey to identify sensitive receptors in the vicinity of Ludlow Telephone that could potentially be impacted by residual soil contamination. The following sensitive receptors were identified in the vicinity of the site:

- Buried utilities (water and wastewater systems) are located along the northern edge of Main Street in the opposite side of the former UST location.
- Several building footing and roof drains daylight to the embankment bordering the Black River.
- Indoor air in portions of the on-site building immediately south of the former tank location (in the cross- or upgradient direction of ground-water flow); the building has a subsurface concrete piping vault near the generator room.
- The Black River, located approximately 30 feet to the north of the site, is the nearest downgradient surface-water body.
- The on-site building and all nearby dwellings are served by the Ludlow municipal water system, which obtains water from springs and an infiltration gallery located on Snell Hill, approximately 4.5 miles south and upgradient of the site.

#### **3.2 Risk Assessment**

MARIN assessed the risks that the residual subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The findings of our risk assessment indicate that the residual subsurface petroleum contamination at the site does not appear to pose a significant threat to any nearby sensitive receptors. Observations made during the UST closure and recent ground-water sample results from monitoring wells completed in and downgradient of the former UST suggest that residual contamination is limited to the immediate vicinity of the former UST.

- On 11 July 1997, visual inspection and PID screening of the on-site building interior did not indicate an impact from the petroleum release to this receptor — no petroleum odors or seeps were observed and PID readings of 0.0 ppm were recorded in the building subsurface basement area and at utility entry points.
- No detectable flows were observed from building footing and roof drains that discharge along the embankment bordering the Black River. Slight sheening was observed on the water surface near the midgradient and downgradient river locations. A strong petroleum odor was also noted at the downgradient location.
- Although the Black River likely represents the eventual surface discharge point of the ground water flowing beneath the site, the natural processes of dilution, dispersion and biodegradation — coupled with the relatively low levels of contamination noted in ground water at the release location — will likely prevent the discharge of significant concentrations of petroleum compounds to this river. No petroleum compounds were detected in any of the surface water samples obtained in the upgradient, midgradient and downgradient direction of the former UST location.
- PID soil screening data from the UST excavation and monitoring-well borings suggest that the area of significant soil contamination is limited to the immediate vicinity of the former UST. The majority of this area is surfaced with concrete or asphalt, and the property is a commercial facility which limits the potential for direct public exposure to contaminated soils.

#### 4.0 CONCLUSIONS

Marin Environmental, Inc. has conducted an initial site investigation at Ludlow Telephone located on Main Street, Ludlow, VT. The principal investigative findings are summarized as follows:

1. Petroleum released from a former underground storage tank (UST) system at the site appears to have resulted in a minor impact to ground water in the vicinity of the former UST system. Analytical results of ground-water samples collected from four on-site monitoring wells did not detect the presence of petroleum compounds above the Vermont Groundwater Enforcement Standards (VGESs). Methyl-tertiary-butyl ether (MTBE) was detected in ground-water samples at levels below the Vermont Health Advisory Guideline and may have resulted from migration along preferential utility pathways or be the result of an upgradient release.
2. Observations made during the UST closure and ground-water sample results from monitoring wells completed in and downgradient of the former UST locations suggest that residual contamination is limited to the immediate vicinity of the former UST.
3. The residual subsurface contamination at the site does not appear to pose a threat to any nearby sensitive receptors.
4. No drinking-water supplies appear to be at risk from the residual contamination at the site. No petroleum compounds were detected in any of the three surface water samples collected from the nearby Black River.
5. Surficial materials at the site consist mainly of medium to fine sand and gravel, with occasional cobbles. On 19 June 1997, the water table was found to range from about 7 to 11 feet below ground surface, and exhibited a northerly trending gradient of about 6 percent.

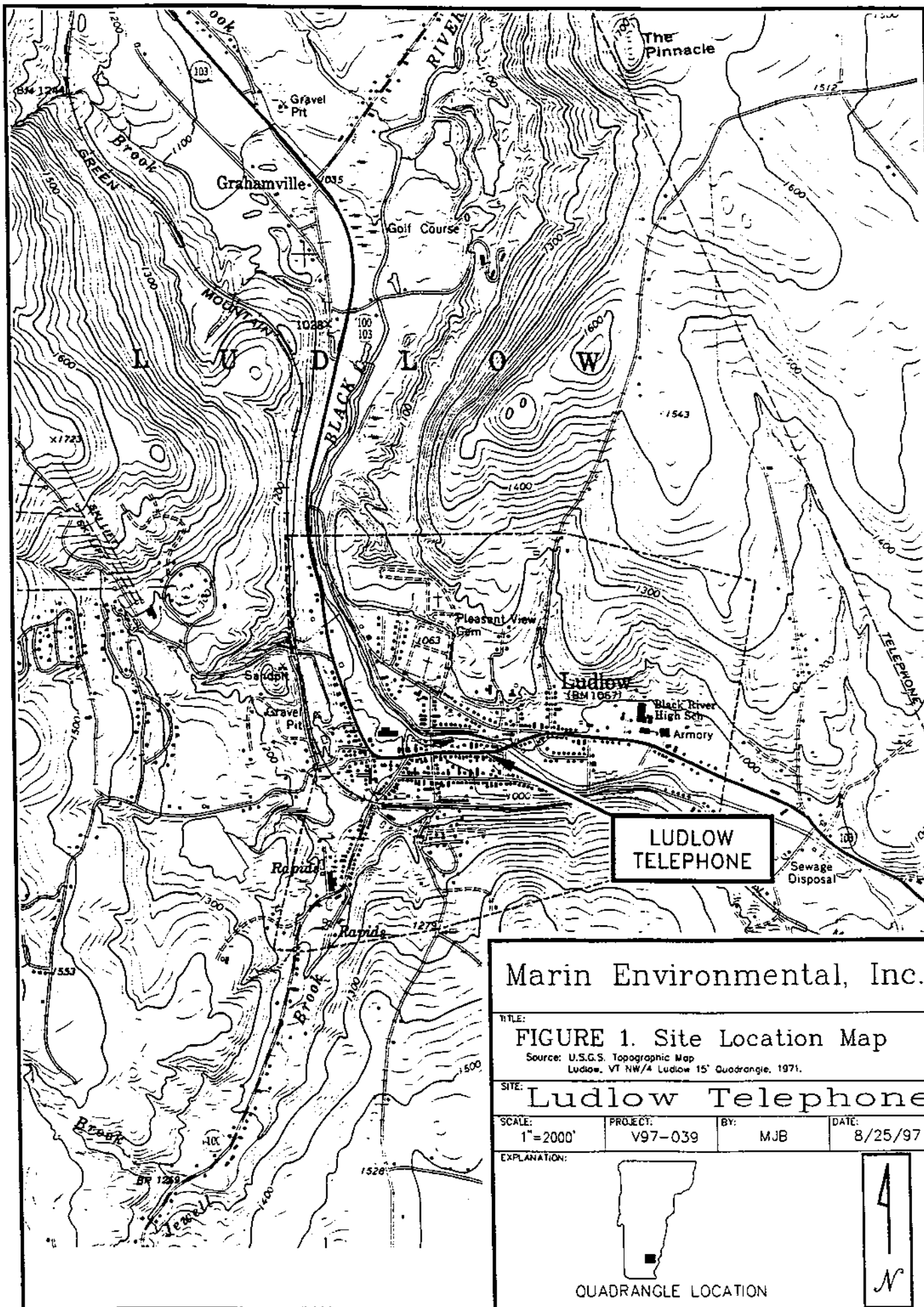
## 5.0 RECOMMENDATIONS

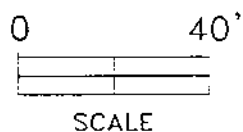
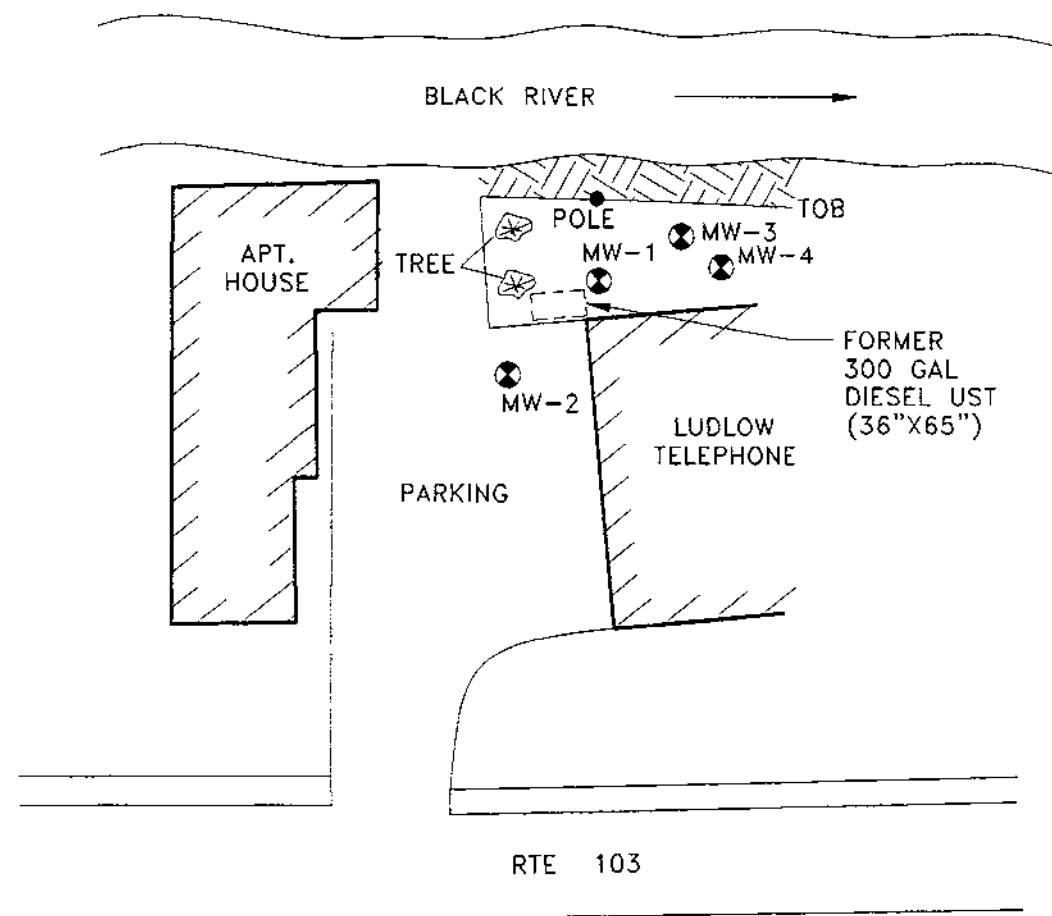
On the basis of the results of this investigation, MARIN makes the following recommendations:

1. The four on-site monitoring wells should be resampled to confirm the June 1997 analytical results. The samples should be analyzed for petroleum-related compounds by EPA Method 8020 and modified EPA Method 8100.
2. If the subsequent ground-water analytical results confirm the findings of the June 1997 analytical data (no exceedance of VGESs), MARIN recommends that the site be considered for "Site Management Activities Completed" (SMAC) status by the Vermont Department of Environmental Conservation (VT DEC) .

## 6.0 REFERENCES

- Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- USGS, 1971. Ludlow, VT Quadrangle . U.S. Geological Survey. 7.5x15 minute series (topographic).





ALL LOCATIONS ARE APPROXIMATE



*Marin Environmental, Inc.*

1700 Hegeman Ave.  
Colchester, VT 05448  
(802) 655-0011

LUDLOW TELEPHONE  
LUDLOW, VT

FIGURE 2.  
SITE MAP  
With Approx. Well Locations

LEGEND:

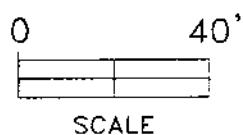
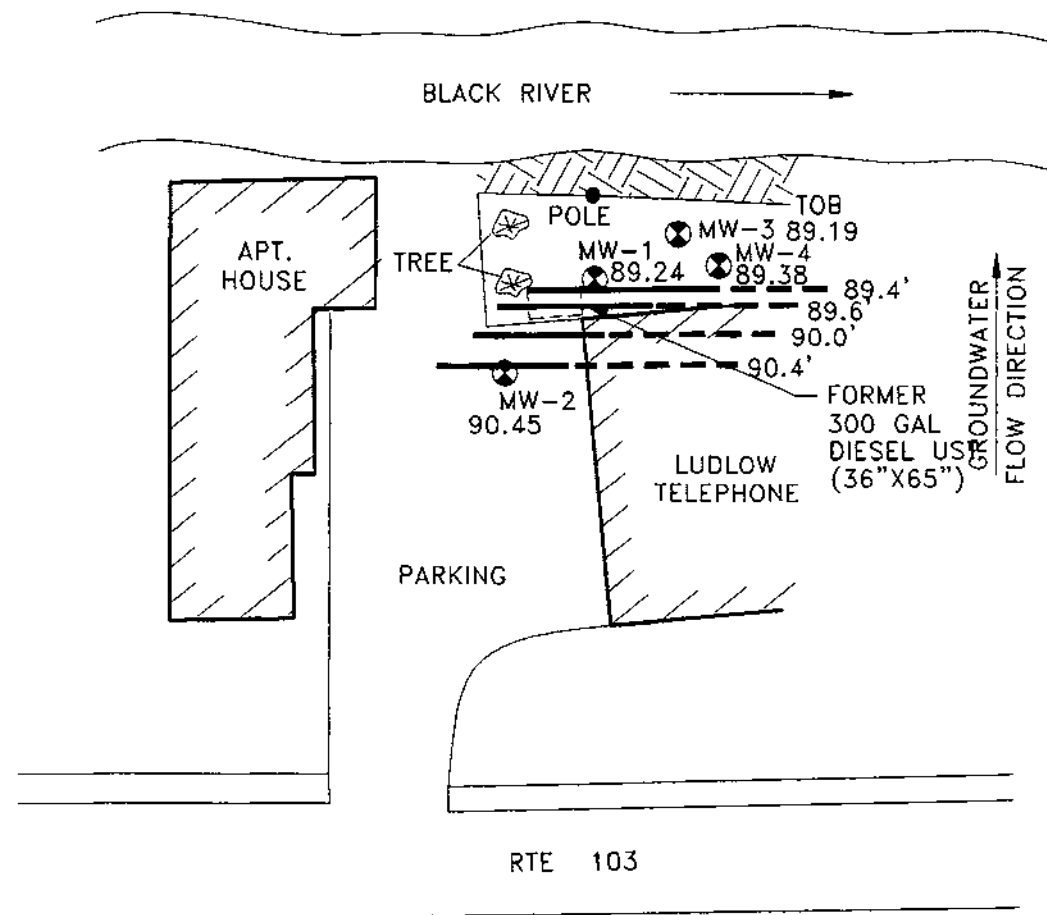
● Approx. Monitoring Well

DRAWN BY: MJB

DATE: AUG 97

APPROVED BY: RM

FILE No.: 97039



ALL LOCATIONS ARE APPROXIMATE



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LUDLOW TELEPHONE  
LUDLOW, VT

FIGURE 3.  
GROUND-WATER CONTOUR MAP  
MONITORING DATE: 19 JUNE 1997

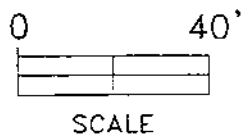
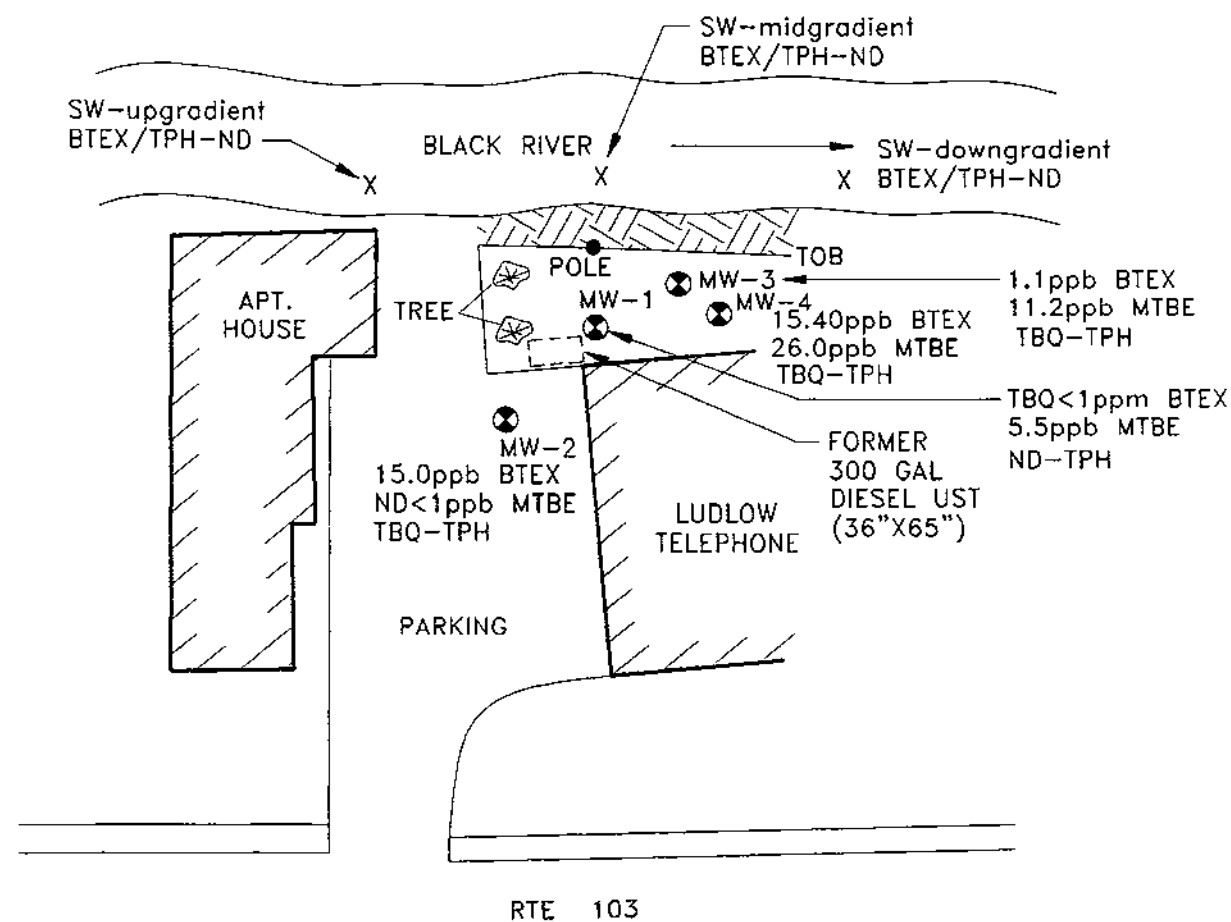
LEGEND: — GROUND-WATER CONTOUR  
● Approx. Monitoring Well

DRAWN BY: MJB

DATE: AUG 97

APPROVED BY: RM

FILE No.: 97039



ALL LOCATIONS ARE APPROXIMATE



*Marin Environmental, Inc.*

1700 Hegeman Ave.  
Colchester, VT 05446  
(802) 655-0011

LUDLOW TELEPHONE  
LUDLOW, VT

FIGURE 4.  
CONTAMINANT DISTRIBUTION MAP  
MONITORING DATE: 19 JUNE 1997

LEGEND: ND NONE DETECTED  
● Approx. Monitoring Well

DRAWN BY: MJB

DATE: AUG 97

APPROVED BY: RM

FILE No.: 97039

DRILLING METHOD  
Vibratory

BORING DIAMETER 1.5"

AND 40 - 50%  
SOME 10 - 40%  
TRACE 0 - 10%

BORING LOCATION

BORING # 1

sketch on back or on site plan

with measurements

TOTAL DEPTH

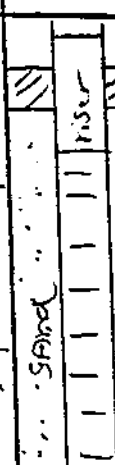

Source Area

15'

DEPTH	SAMPLES	SAMPLE	NUMBER	BLOWS PER 6"
				0 6 12 18 24

REG.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
2'	dark brown loamy fill		dry, no odor 11.2 ppm		
3.5'	light brown, med. sand		dry, no odor 2.0 ppm		5'
	SAME		moist 3.8 ppm no odor		10'
3	dark brown, silty sand		moist 2.0 ppm		15'
	SAME		wet 5.4 ppm		
	dark gray, silty sand & gravel		↓ 3.6 ppm		20'
			GW @ 10' bgs Bow @ 15' bgs Screen 5-15' bgs developed		25'
					30'
					35'
					40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC	4'	WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

DRILLING METHOD										BORING LOCATION		BORING #	
Vibratory										Sketch on back or on-site plan		2	
DRILLING DIAMETER 1.5"										with measurements		TOTAL DEPTH	
BLOWS PER 6"										upgradient parking lot		15'	
DEPTH	SAMPLES	SAMPLE NUMBER	0	6	12	18	24	REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
								3	dark brown loamy sand		dry, no odor 4.2 ppm		
5'									light brown med. sand		↓ 4.7 ppm		
								2	same		dry 19.9 ppm		5'
10'									coarse sand + gravel		moist 14.2 ppm		10'
								3	dark black coarse gravel		wet, petio. odor 35.5 ppm		
15'									light gray silty sand		↓ st. odor 2.9 ppm		15'
20'											GW @ 7.5'		20'
											Screen 4'-14'		
											Developed		
25'													25'
30'													30'
35'													35'
40'													40'

MATERIALS USED			SIZE/TYPE	QUANTITY	MATERIALS USED			SIZE/TYPE	QUANTITY
WELL SCREEN	---	---	1.5" PVC	10'	GROUT	---	---		
SLOT SIZE	---	---	0.01"		BACKFILL	---	---		
RISER PIPE	---	---	1.5" PVC	4'	WATER USED	---	---		
GRADED SAND	---	---			STEAM CLEANER	---	---		
PELLET BENTONITE	---	---							
GRANULAR BENTONITE	---	---							

**DRILLING METHOD**

Vibratory

BORING DIAMETER 1.5"

AND 40 - 50%  
SOME 10 - 40%  
TRACE 0 - 10%

**BORING LOCATION**

BORING # 3

sketch on back or on site plan

with measurements TOTAL DEPTH  
downgradient, edge river 18.5

DEPTH	SAMPLES	SAMPLE	NUMBER	BLOWS PER 5'	REC.	SAMPLE DESCRIPTION	STRAT	GENERAL DESCRIPTION	WELL	DEPTH
				0 6 12 18 24			CHG		DETAIL	
					1.5'	dark brown topsoil And blacktop		dry, no odor 0.5 ppm		
5'					0	refusal due to cobbles drill point advanced unable to obtain sample				5'
10'					1.0	coarse sand + gravel		wet no odor 1.7 ppm		10'
15'					1.0	dark gray silty sand + gravel (coarse)		same 6.0 ppm		15'
20'								refusal @ 18.5'		20'
25'								screen 17.5-7.5'		25'
30'								Gwe 12'		30'
35'								sand 17.5-6.2'		35'
40'								Developed		40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

**DRILLING METHOD**

**vibratory**

**BORING DIAMETER** **1.5"**

AND 40 - 50%  
SOME 10 - 40%  
TRACE 0 - 10%

**BORING LOCATION**

**BORING #** **(4)**

start on back or on-site plan  
with measurements  
PAVED WALKWAY

**TOTAL DEPTH**  
**20'**

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6"				
			0	6	12	18	24
5'							
10'							
15'							
20'							
25'							
30'							
35'							
40'							

REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
3.0	blacktop, fill, glass/wood debris, cobbles		dry, no odor 0.0 ppm		
0	COARSE GRAVEL no recovery				5'
2	COARSE SAND + GRAVEL dark brown		dry, no odor 31.5 ppm		10'
2	Fine silty SAND + gravel dark gray silty SAND + GRAVEL		wet, sl. odor 153 ppm 70.1 ppm		15'
			GWC 11.3' Depth well - 18' SAND 18'-3' Screen 18'-8' Not developed		20'
					25'
					30'
					35'
					40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.01"		BACKFILL		
RISER PIPE	1.5" PVC		WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					



**ENDYNE, INC.**

**Laboratory Services**

32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333  
FAX 879-7103

**REPORT OF LABORATORY ANALYSIS**

CLIENT: Marin Environmental  
PROJECT NAME: Ludlow Telephone  
REPORT DATE: June 25, 1997  
DATE SAMPLED: June 19, 1997

PROJECT CODE: GWVT1757  
REF.#: 105,665 - 105,670C

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

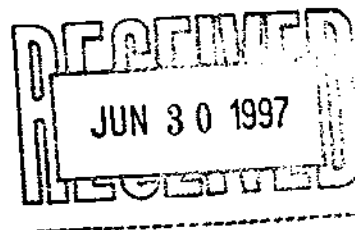
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by

for  
Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



**ENDYNE, INC.****Laboratory Services**

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Williston, Vermont 05495  
(802) 879-4333  
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**EPA METHOD 8020--PURGEABLE AROMATICS****CLIENT:** Marin Environmental**DATE RECEIVED:** June 20, 1997**PROJECT NAME:** Ludlow Telephone**REPORT DATE:** June 25, 1997**CLIENT PROJ. #:** V97039**PROJECT CODE:** GWVT1757

Ref. #:	105,665	105,666	105,667	105,668	105,669
Site:	Trip Blank	Duplicate	MW-4	MW-3	MW-2
Date Sampled:	6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
Time Sampled:	9:20	NI	12:44	12:35	12:59
Sampler:	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw
Date Analyzed:	6/23/97	6/23/97	6/23/97	6/23/97	6/23/97
UIP Count:	0	>10	>10	>10	>10
Dil. Factor (%):	100	100	100	100	100
Surr % Rec. (%):	99	103	102	103	98
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<1	<1	2.6	TBQ <1	<1
Chlorobenzene	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1
Ethylbenzene	<1	<1	8.3	1.1	8.6
Toluene	<1	<1	<1	<1	<1
Xylenes	<1	<1	4.5	<1	6.4
MTBE	<1	6.3	26.0	11.2	<1

Ref. #:	105,670	105670A	105670B	105670C	
Site:	MW-4	Black R. Up	Black R. Mid	Black R. Down	
Date Sampled:	6/19/97	6/19/97	6/19/97	6/19/97	
Time Sampled:	13:10	13:25	13:28	13:32	
Sampler:	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw	
Date Analyzed:	6/23/97	6/24/97	6/24/97	6/24/97	
UIP Count:	>10	0	0	0	
Dil. Factor (%):	100	100	100	100	
Surr % Rec. (%):	101	100	101	98	
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	
Benzene	<1	<1	<1	<1	
Chlorobenzene	<1	<1	<1	<1	
1,2-Dichlorobenzene	<1	<1	<1	<1	
1,3-Dichlorobenzene	<1	<1	<1	<1	
1,4-Dichlorobenzene	<1	<1	<1	<1	
Ethylbenzene	TBQ <1	<1	<1	<1	
Toluene	<1	<1	<1	<1	
Xylenes	<1	<1	<1	<1	
MTBE	5.5	<1	<1	<1	

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated



## CHAIN-OF-CUSTODY RECORD

22709

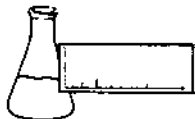
Project Name: Site Location:	Cudlow Telephone Colchester VT 05445	Reporting Address: 1700 Hegeman Ave Colchester VT 05445	Billing Address:
Endyne Project Number:	GWVT 1757	Company: Contact Name/Phone #:	Samplers Name: Phone #:
		Marin Environmental	J Bouyau

[illegible]

Relinquished by: Signature <u>Bruce Hammett</u>	Received by: Signature <u>James Monroe</u>	Date/Time <u>6-20 1:45</u>
Relinquished by: Signature	Received by: Signature <u>David M. Chambers</u>	Date/Time <u>6-20-97 12:25</u>

New York State Project: Yes ☐ No ☒ Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD <sub>5</sub>	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify): <b>8020 + MTBE</b>										



**ENDYNE, INC.**

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FAX 879-7103

**REPORT OF LABORATORY ANALYSIS**

CLIENT: Marin Environmental  
PROJECT NAME: Ludlow Telephone/V97039  
DATE REPORTED: July 29, 1997  
DATE SAMPLED: July 11, 1997

PROJECT CODE: GWVT1359  
REF. #: 106,659 - 106,667

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

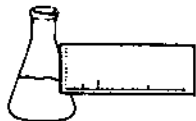
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Reviewed by,

Harry B. Locker, Ph.D.  
Laboratory Director

enclosures



**ENDYNE, INC.**

**Laboratory Services**

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(802) 879-4333  
FAX 879-7103

**LABORATORY REPORT**

**TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8100**

DATE: July 29, 1997

CLIENT: Marin Environmental

PROJECT: Ludlow Telephone/V97039

PROJECT CODE: GWVT1359

COLLECTED BY: J. Gonyaw

DATE SAMPLED: July 11, 1997

DATE RECEIVED: July 14, 1997

Reference #	Sample ID	Concentration (mg/L) <sup>1</sup>
106,659	Trip Blank; 11:45	ND <sup>2</sup>
106,660	Duplicate	TBQ <sup>3</sup>
106,661	MW-1; 1300	ND
106,662	MW-2; 1240	TBQ
106,663	MW-3; 1223	TBQ
106,664	MW-4; 1207	TBQ
106,665	Up-Stream; 1150	ND
106,666	Mid-Stream; 1155	ND
106,667	Down-Stream; 1157	ND

**Notes:**

- 1 Method detection limit is 0.8 mg/L.
- 2 None detected
- 3 Trace below quantitation limit



32 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333





## CHAIN-OF-CUSTODY RECORD

22837

V97039

Project Name: Site Location:	1udlow Telephone colchester, VT 05446	Reporting Address: Billing Address:	1700 Heyman Ave
Endyne Project Number:	G WVT1359	Company: Contact Name/Phone #:	Marin Env. 655-0011
		Sampler Name: Phone #:	J. Gonyaw

[illegible]

Relinquished by: Signature 	Received by: Signature 	Date/Time 4:00 7/14/97
Relinquished by: Signature 	Received by: Signature 	Date/Time 7/14/97 2:10pm

New York State Project: Yes \_\_\_\_\_ No \_\_\_\_\_

### Requested Analyses

[illegible]